

REMARKS

Applicants respectfully request that the Amendment and Response to Final Office Action be admitted under 37 C.F.R. 1.116. Applicants submit that this amendment presents claims in better form for consideration on appeal. Furthermore, applicants believe that consideration of this amendment could lead to favorable action that would remove one or more issues for appeal. Applicants submit that thus there is good and sufficient reason why this amendment should be admitted now. Reconsideration of this application, as amended, is respectfully requested. Claims 1-29 are pending. Claims 1-15, 28 and 29 stand rejected.

Claims 1 and 14 have been amended. Claims 9 – 12 and 16-27 have been cancelled. Claim 30 has been added. Support for the amendments is found in the specification, the drawings, and in the claims as originally filed. Applicants submit that the amendments do not add new matter.

Rejections Under 35 U.S.C. § 103(a)

Claims 1, 4, 6-10, 13-15, 28 and 29 stand rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,065,424 of Shacham-Diamand, et al. (“Shacham-Diamand”) in view of U.S. Patent No. 6,248,168 of Takeshita, et al. (“Takeshita”).

The Examiner has rejected claims 1, 4, 6-10, 13-15, 28 and 29 under 35 U.S.C. § 103 as being unpatentable over Shacham-Diamand in view of Takeshita.

The Examiner has stated

Shacham-Diamand, et al. are silent concerning the cover being movable between an open and closed position, the closed position sealing the processing chamber for pressurization. However, it was known in the art at the time the invention was made to provide in a spray deposition apparatus, an automated cover movable between an open and closed position with the closed position sealing the processing chamber for pressurization as evidenced by Takeshita, et al. (see col. 30, lines 29-32 and col. 31., lines 26-27). It would have been obvious to one of ordinary skill in the art to provide the automated cover as taught by Takeshita, et al. in the Shacham-Diamand, et al. apparatus to facilitate sealing of the chamber for pressurization without the need of an operator.

Even though Shacham-Diamand, et al. do not explicitly state how gas pressure is released in the processing chamber such as through an exhaust line separate from the drain line, it was known in the art at the time the invention was made, to provide an exhaust line (29) separate from a drain line (28) in communication with the deposition chamber in order to exhaust pressurizing gas or vapor from the deposition chamber as evidenced by Takeshita, et al. (see col. 28, lines 10+; see Fig. 25). It would have been obvious to one of ordinary skill in the art to provide an exhaust line, separate from the drain line in communication with a spray deposition chamber, as taught by Takeshita, et al., on the Shacham-Diamand, et al. processing chamber in order to quickly and efficiently release pressurized gas or vapor from the processing chamber when recycling of the gas or vapor is not necessary or desired.

With respect to claims 7, 8 and 13, see Shacham-Diamand, et al., col. 6, lines 27-48.

Shacham-Diamand, et al. do not teach or suggest the cover being movable between an open and closed position, the closed position sealing the processing chamber for pressurization. However, it was known in the art at the time the invention was made to provide in a spray deposition apparatus an automated cover movable between an open and closed position with the closed position sealing the processing chamber for pressurization as evidenced by Takeshita, et al. (see col. 30, lines 29-32 and col. 31, lines 26-27). It would have been obvious to one of ordinary skill in the art to provide the automated cover as taught by Takeshita, et al. in the Shacham-Diamand, et al. apparatus to facilitate sealing of the chamber for pressurization without the need of an operator.

With respect to claim 15, see Shacham-Diamand, et al., col. 6, lines 44-48.

With respect to claims 28 and 29, see Shacham-Diamand, et al., col. 6, lines 49-52.

(Page 2-4, Office Action 10/17/03)

Applicants respectfully submit that claim 1, as amended, is not rendered obvious by Shacham-Diamand in view of Takeshita. Amended claim 1 includes the following limitations.

“An apparatus for electroless spray deposition of a metal layer on a substrate, comprising:
a processing chamber to hold at least one substrate on which the metal layer is to be deposited, the processing chamber including at least one section movable between an open position to allow the at least one substrate to be introduced into and removed from the processing chamber and a closed position to seal the processing chamber to allow for pressurization of the processing chamber;
an inlet to provide pressurizing gas to the processing chamber;
an exhaust line to exhaust pressurizing gas from the processing chamber;
a source of electroless plating solution;
a sprayer provided within the processing chamber and connected to the source of electroless plating solution to spray the electroless plating solution onto the at least one substrate;

a drain provided in the processing chamber to drain the electroless plating solution from the processing chamber; and
a pressure regulator within the processing chamber to regulate pressure within the processing chamber, the pressure regulator including a shutter provided in the exhaust line and a valve provided in the drain”.

(Amended claim 1) (Emphasis added).

Applicants respectfully submit that Shacham-Diamand does not disclose these limitations. Shacham-Diamand discloses that a nitrogen source 46 is provided with a pressure regulator. Shacham-Diamand does not disclose anything further about the pressure regulator of the nitrogen source 46. Shacham-Diamand discloses

“A nitrogen source 46 is connected via line 48 and valve 50 to the process chamber 40. The nitrogen source is provided with a pressure regulator so that the pressure of the gas supplied to the chamber may be regulated as desired”.

(Col. 6, lines 49 -52)

The pressure regulator is not referenced, but is described as provided to the nitrogen source 46. The Examiner has equated the pressure regulator with the valve 50, though Shacham-Diamand does not disclose such. The valve 50, may regulate pressure in the process chamber 40, and may be the “pressure regulator” provided to nitrogen source 46. Shacham-Diamand does not make this clear, as neither the unreferenced pressure regulator nor the valve 50 are further discussed. In either case, whether the pressure regulator is provided to nitrogen source 46 through some undescribed means or the pressure regulator is the valve 50, the pressure regulator of Shacham-Diamand is not “within” the process chamber as claimed in amended claim 1.

Moreover, the pressure regulator, as claimed, includes both a shutter in an exhaust line and a valve in a drain. This combination is not taught or suggested by any proffered references, alone or in combination.

For these reasons, applicants respectfully submit that amended claim 1 is not rendered obvious by Shacham-Diamand in view of Takeshita. Given that claims 2 – 8, 13 and 28 depend, directly or indirectly from claim 1, applicants respectfully submit that claims 2 – 8, 13 and 28 are likewise not rendered obvious by Shacham-Diamand in view of Takeshita. Further, that claim

14 includes the same limitation, and given that claims 15 and 29 depend from claim 14, applicants respectfully submit that claim 14, 15, and 29 are likewise not rendered obvious by Shacham-Diamand in view of Takeshita.

Applicants respectfully submit that claim 13 is not rendered obvious by Shacham-Diamand in view of Takeshita. Claim 13 includes the following limitations.

“The apparatus according to claim 7, further comprising at least one additional reservoir to contain at least one fluid selected from the group consisting of a pre-cleaning fluid, a pre-wetting fluid, ultra-pure water, deionized water, and a post-cleaning fluid.”

(Claim 13)

Applicants respectfully submit that the “additional reservoir” containing a pre-treatment solution is not disclosed in Shacham-Diamand. Shacham-Diamand describes reservoirs for the metal stock solution and for the reducing solution, however, when Shacham-Diamand discusses the DI water, no mention of a reservoir is made. Rather, the DI water is described as coming from a DI water source, not a reservoir. Shacham-Diamand discloses

“A first reservoir 4 contains a metal stock solution. The metal stock solution is connected via line 6 to a manifold 10. A metering valve 8 allows precise control of the flow of the metal stock solution to the manifold 10. A second reservoir 12 contains a reducing solution and is connected via line 14 and metering valve 16 to manifold 10. A high purity deionized (DI) water source 18 may be connected via line 20 and metering valve 22 to manifold 10. Waste can be removed from manifold 10 by opening valve 30 in line 26.”

(Col. 6, lines 27 – 36)

Shacham-Diamand makes no mention of a reservoir to contain the claimed fluids. As the mention of the DI water source is proximate to the mention of reservoirs for other purposes, it is clear that Shacham-Diamand did not contemplate a reservoir for the DI water, but instead contemplated connection to a DI water source as stated. Regardless of what may have been contemplated, no mention of a DI water reservoir is made.

For these reasons, applicants respectfully submit that claim 13 is not rendered obvious by Shacham-Diamand in view of Takeshita.

Claims 1-3, 6-15, 28 and 29 stand rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,065,424 of Shacham-Diamand, et al. ("Shacham-Diamand") in view of U.S. Patent No. 6,065,424 of Talieh, et al. ("Talieh"). The Examiner stated

Shacham-Diamand, et al. do not teach or suggest the chamber including at least one section movable between an open and closed position, the closed position sealing the processing chamber for pressurization. However, it was known in the art at the time the invention was made to provide in a deposition processing chamber, an automated chamber body and stationary cover whereby the chamber body moves between open and closed positions as evidenced by Talieh, et al. (see col. 6, lines 65+ to col. 7, lines 1-2). It would have been obvious to one of ordinary skill in the art to provide an automated chamber body as taught by Talieh, et al. in the Shacham-Diamand, et al. apparatus to facilitate sealing of the chamber for pressurization without the need of an operator.

Even though Shacham-Diamand, et al. do not explicitly state how gas pressure is released in the processing chamber such as through an exhaust line separate from the drain line, it was known in the art at the time the invention was made, to provide a gas exhaust line (61) separate from a drain line (17a, 17b) in communication with the deposition chamber in order to exhaust pressurizing gas or vapor from the deposition chamber as evidenced by Talieh, et al. (see col. 6, lines 42-49; see Fig. 4). It would have been obvious to one of ordinary skill in the art to provide an exhaust line, separate from the drain line in communication with a spray deposition chamber, as taught by Talieh, et al., on the Shacham-Diamand, et al. processing chamber in order to quickly and efficiently release pressurized gas or vapor from the processing chamber when recycling of processing fluids is desired.

(p. 5-7 Office Action 10/17/03)

Applicants respectfully submit that new claim 30 is not rendered obvious by Shacham-Diamand in view of Talieh. New claim 30 includes the following limitations.

An apparatus for electroless spray deposition of a metal layer on a substrate, comprising:
a processing chamber to hold at least one substrate on which the metal layer is to be deposited, the processing chamber including at least one section movable between an open position to allow the at least one substrate to be introduced into and removed from the processing chamber and a closed position to seal the processing chamber to allow for pressurization of the processing chamber;
an inlet to provide pressurizing gas to the processing chamber;
an exhaust line to exhaust pressurizing gas from the processing chamber;
a pressure regulator to regulate pressure within the processing chamber;
a source of electroless plating solution;

a sprayer provided within the processing chamber and connected to the source of electroless plating solution to spray the electroless plating solution onto the at least one substrate;

a drain provided in the processing chamber to drain the electroless plating solution from the processing chamber; and

a rotatable chuck provided within the processing chamber, the rotatable chuck having a passage formed therein to allow fluid to flow to the back of a substrate positioned on the chuck.

(Claim 30)(Emphasis added)


Applicants respectfully submit that the limitation of a “rotatable chuck having a passage formed therein to allow fluid to flow to the back of a substrate positioned on the chuck” is not disclosed in any proffered reference or combination thereof. This limitation was claimed in original claim 11 (cancelled) which it appears the Examiner did not specifically address.

Applicants respectfully request that the Examiner address the patentability of this limitation in the context of new claim 30.

It is respectfully submitted that in view of the amendments and arguments set forth herein, the applicable rejections and objections have been overcome. If there are any additional charges, please charge Deposit Account No. 02-2666 for any fee deficiency that may be due.

Respectfully submitted,

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